PXP

Plains Exploration & Production Company

Revisions to the Point Pedernales Field DPP
Tranquillon Ridge Field

Supporting Information Volume
Cementing Program and Muds and Cuttings

Submitted to:
The Minerals Management Service
Pacific OCS Region

Submitted by:
Plains Exploration & Production Company

May 2008

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This application for revisions to the Point Pedernales Field DPP is for development of the Tranquillon Ridge Field. Tranquillon Ridge Field is geographically located within Federal and State waters approximately one and a half miles due west of the coastline at Point Arguello, offshore California. The field is east and adjacent to federal offshore tracts OCS-P 0441 and OCS-P 0444, both of which are parts of the Pt. Pedernales Unit.

1.0 Cementing Program

A cementing system will be used to force cement down the well to seal the annulus between the casing and the hole or between concentric casing strings. The cementing program details are provided in Table 1.

2.0 Mud System

A mud system is used to control well pressure, lubricate the drill pipe and bit, and return drill cuttings to the surface. It is possible that mineral oil based muds may be used for drilling the longer portions of the wells. In addition, muds containing additives not approved by the EPA, or containing concentrations above EPA limits will be taken ashore via boats. Mineral oil based muds will be collected on the platforms and sent ashore for recycling and/or disposal. Attachment B provides a more detailed description of the mud equipment. Attachment C contains the estimated mud composition for a sample well (Irene B-1).

Mud monitoring equipment will be installed and maintained for all drilling below the 20-inch diameter conductor casing, primarily for the purpose of well control. The equipment includes: sensors, which continuously record mud pit level and flowline flow; alarms at the driller’s station will indicate lost circulation displacement volume; and on-bottom kicks.

The trip tank monitors fluid gain or loss from the wellbore while the drillstring is being pulled out of the hole.

Table 1 Cementing Program Details

Casing Diameter (in)	Set Depth (ft) MD	Type	Mix Seawater or Fresh	Density (ppg)	Yield, (cft/sack)	Top of Cement[1] (feet) MD	Openhole Excess (%)	Number of Sacks	13-3/8" casing tvd 3200 ft 9-5/8" casing tvd 4077 ft 7" casing 4500 ft
20	800	Lead	Seawater	11.5	3.02	362 (mudline)	100	358	Class G + 54 ghs A-7L (liquid Calcium Chloride) + 68 ghs A-3L + 2 ghs FP-6L
20	800	Tail	Seawater	15.8	1.19	600	100	786	Class g + 5 ghs CD-31L + 40 ghs A-7L + 2 ghs FP-6L
13.375	7,500	Lead	Fresh water	11.5	2.81	362 (mudline)	50	2184	Class G + 68 ghs A-3L + 2 ghs R-8L + 2 ghs FP-6L
13.375	7,500	Tail	Fresh water	15.8	1.15	6,000	50	1414	Class G + 8 ghs CD-31L + 20 ghs FL-67L + 6 ghs R-21L + 2 ghs FP-6L
9.625	15,200	Lead	Fresh water	11.5	2.97	12,200	25	264	Class G + 68 ghs A-3L + 10 ghs R-8L + 2 ghs FP-6L
9.625	15,200	Tail	Fresh water	15.8	1.15	14,200	25	369	Class G + 22 ghs FL-67L + 6 ghs CD-31L + 3 ghs ASA-301L + 8 ghs R-21L + 2 ghs FP-6L
7	19,000	Tail	Fresh water	13.5	1.25	13,700	25	873	Texas Lightweight Cement + 7 ghs R-21L + 5 ghs CD-31L + 2 ghs ASA-301L + 2 ghs FP-6L + 20 ghs FL-67

1. *Measured from rig floor. Casing setting depths are an average based on the 22 proposed well locations.*

Nomenclature:

ghs – gallons per 100 sacks of cement
cft/sack – cubic feet per sack of cement
A-3L – liquid sodium metasilicate, extender
CD-31L – liquid cement dispersant, friction reducer
FL-33L – liquid fluid loss
FL-63L – liquid fluid loss
ppg – pounds per gallon
FP-6L – liquid foam preventer
A-7L – liquid calcium chloride, accelerator
FL-33L – liquid retarder
R-8L – liquid retarder
ASA-301L – liquid anti-setting

As is evident by the lengthy production history of the Point Pedernales Field it is not expected that any shallow gas will be encountered. However, it is possible that shallow gas could be found in the Foxen formation. Diligent efforts will be maintained to keep the wellbore full of fluid whenever possible.

3.0 Drilling Fluids and Cutting Disposal

The estimated water based cuttings and mineral oil based cuttings and drilling fluid volumes for the fourteen (14) proposed wells is provided in Figure 1. The information in this figure is based on use of an environmentally acceptable water base drilling fluid for a portion of each well and mineral oil based drilling fluids for the longer reach portions of each well. It is expected that the mineral oil based drilling fluid will be used for the 12 ¼" and 8 ½" drill hole size only. The other drill hole sizes will use water based drilling fluids. Figure 2 shows the estimated mineral oil based muds and cuttings that would be generated from each well for drilling the 12 ¼" and 8 ½" hole sizes.

Table 2 provides an estimate of the properties of the water based and mineral oil based drilling fluids that will be used for the drilling program.

Table 2 Proposed Water and Mineral Oil Based Drilling Fluid Properties

Property	26"	17 1/2"	12 1/4"	8 1/2"
MW, ppg	8.6 - 8.7	9.0 - 9.4	9.0 - 10.2	8.6 - 9.2
Visc (sec/qt)	100+	50 - 58	55 - 65	40 - 50
Fluid Loss (cc 30 min)	NC	<25	NA	NA
HTHP @ 300 F	NA	NA	6 - 8	6-8
3 RPM Reading	22	8	> 8	> 6
Solids Content	NC	<7 % LGS	< 6 % LGS	< 6 % LGS
Mud Components	Seawater Durogel Soda Ash	Gel M-I Bar Soda AsH SP101 Drilzone Lube 167	Versa-mul Versa-coat VG plus Lime CaCl2 VG Supreme M-I Bar	Versa-mul Versa-coat VG plus Lime CaCl2 VG Supreme M-I Bar

Figure 1 Estimated Volume of Water Base and Mineral Oil Based Muds and Cuttings for Entire Well

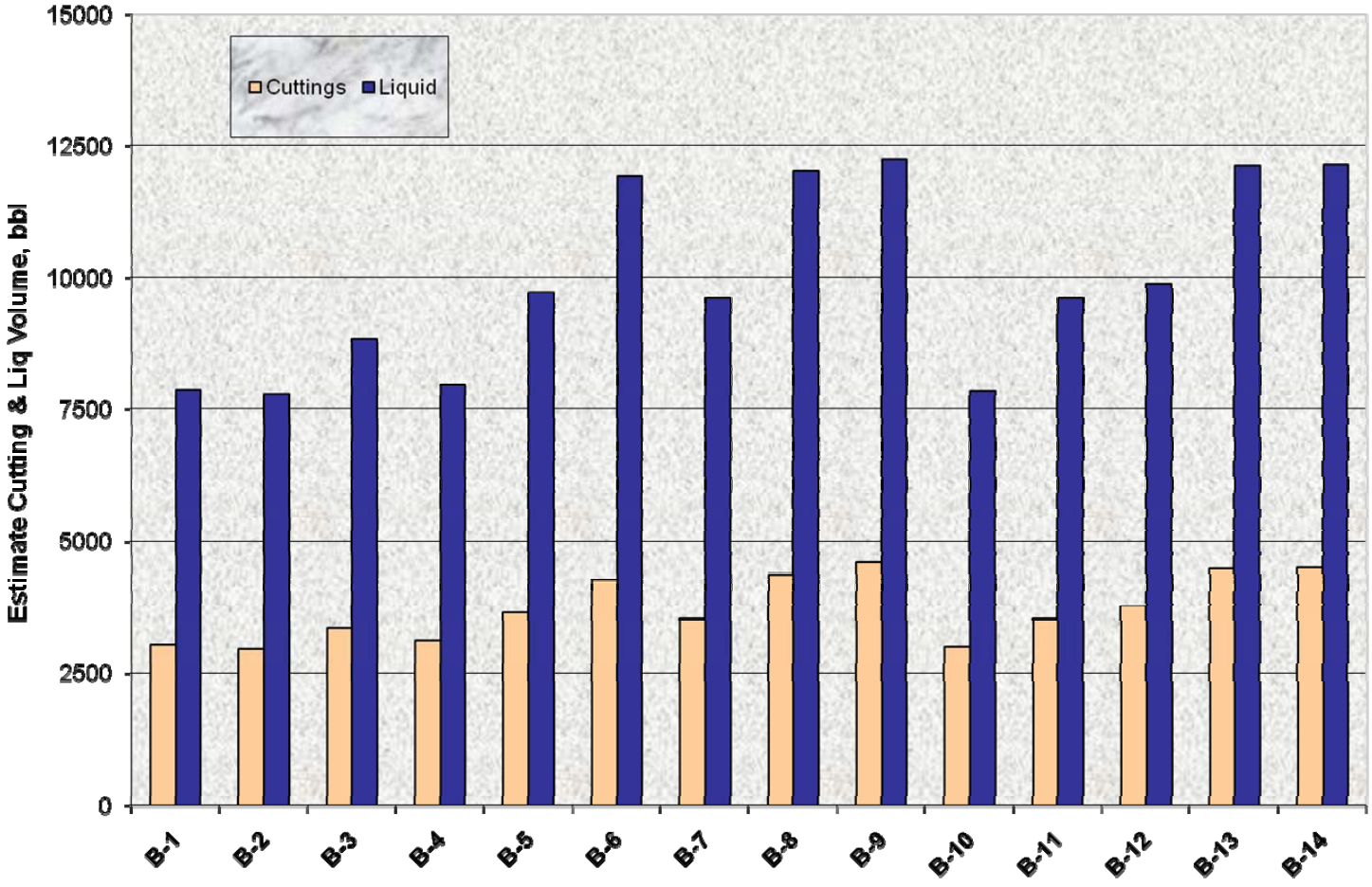
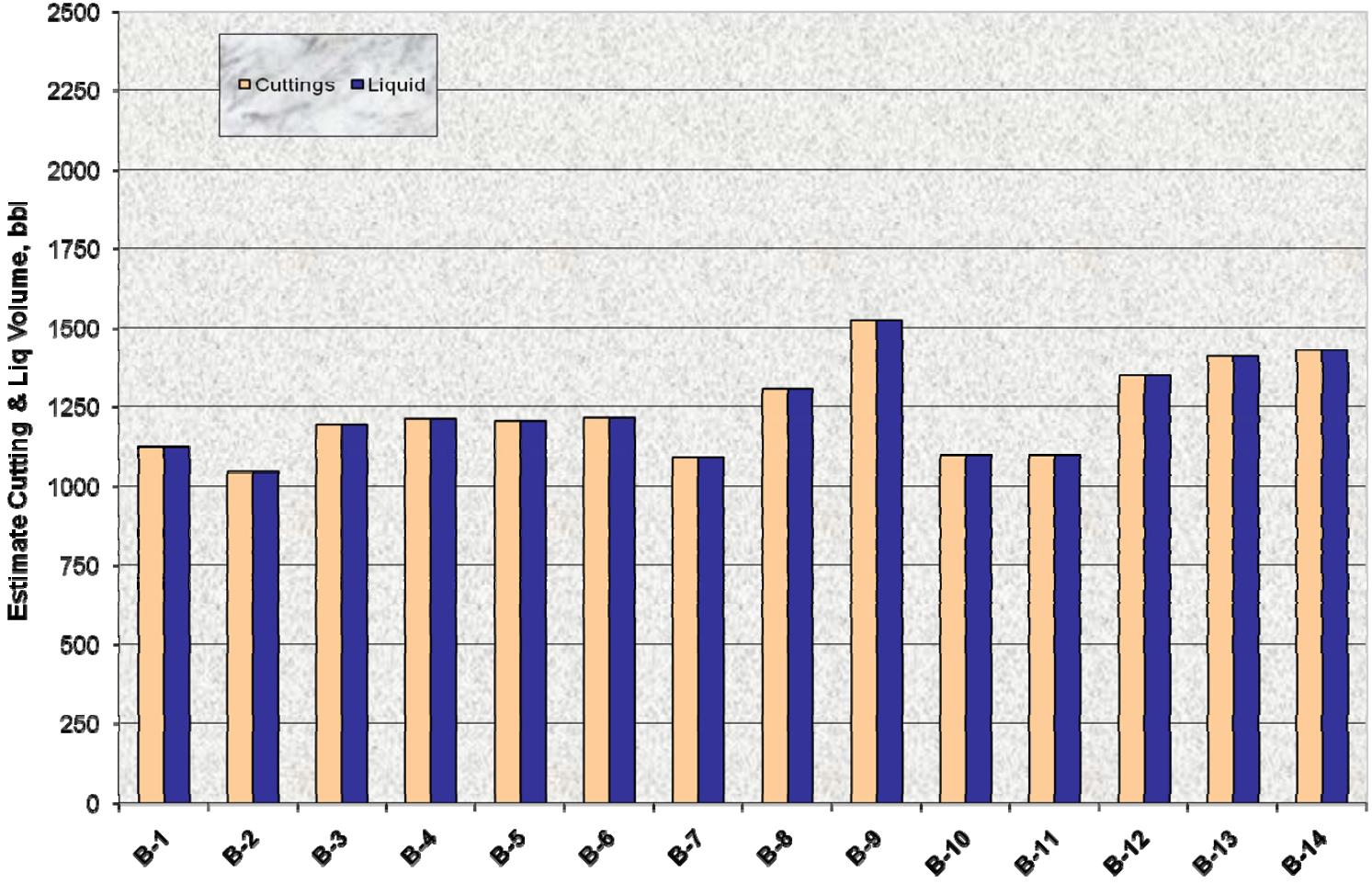


Figure 2 Estimated Volume of Mineral Oil Based Muds and Cuttings from Drilling the 12 ¼" and 8 ½" Hole Sizes



It has been assumed that mineral oil drilling fluids will be used to drill some of the longer portions of the wells. There will be no discharges of the mineral oil based drilling fluid or cuttings into the ocean, except as may be allowed by the EPA. The drilling fluid company typically purchases the used mineral oil drilling fluid. The cuttings spoils generated with mineral oil base drilling fluids will be disposed of at an approved onshore disposal site or facility. The cuttings will be collected in steel roll-off bins, and then transferred to shore on regularly scheduled supply boat trips. The bins that will be used offshore will be liquid tight. They will be purchased with a rubber seal installed around the door area to help prevent any liquid from leaking. These seals will be periodically checked to and replaced if needed.

In addition to the rubber seal a polyurethane resin foam material will be applied around the door seal area. Inside the bin there will be two plastic-poly bin liners to further protect against any leakage.

The roll-off bins will be taken via roll-off truck to the designated disposal site. Used drilling fluid will be emptied into Coast Guard-approved closed top tanks and sent to shore via regularly scheduled supply boats. Once on shore, vacuum trucks will transport used drilling fluids to the drilling fluid suppliers' operations base.

Another possible option for disposal of the low toxicity mineral oil drill cuttings is injection back into the underground formation, as performed at Rocky point Filed. The typical process that is used for injection of cutting into an underground formation is described below. The cuttings are ground to a fine particle size and mixed with seawater in various ratios to obtain desired density (10.0-12.5 lb/gal) and viscosity (60-90 sec/qt funnel). In addition to slurried cuttings, typically all wash water, contaminated rain water and displacement interface fluids collected are injected along with the cuttings.

For a typical proposed well about 16,000 bbls of material will be injected into the underground formation. This would include approximately 4,500 bbls of cuttings and absorbed fluids for the mineral oil based portion of the well. About 450 bbls of interface and contaminated drilling fluid, about 7,500 bbls of seawater for building slurry, and about 3,550 bbls of wash water and contaminated deck drainage would be injected into the casing annulus.

The typical process for handling the cutting for injection is as follows. The cuttings are transported from the shale shakers, using a vacuum transfer system, into a slurry tank. The cuttings are then mixed thoroughly with water and circulated through a centrifugal shredding pump. Any particle larger than about 20 mesh equivalent is screened out over a shaker screen and returned to the slurry tank for further particle size attrition. Once the desired slurry properties are achieved, the fluid is transported into a holding tank. An injection pump is then used to inject the slurry down the casing annulus or into a dedicated cuttings disposal well on the platform. If needed, the drill rig cement unit pump can be used as a backup for the injection pump.

For each proposed well the injection of the mineral oil based cuttings would occur over a period of approximately 50 to 70 days.